

**Exploring the Senses:**  
**Synaesthesia and its role in our lives**

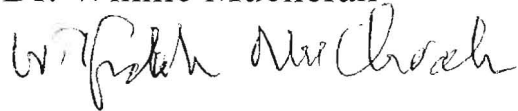
**An Honors Thesis (HONRS 499)**

**by**

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A handwritten signature in black ink, appearing to read "Winnie Mucherah", written in a cursive style.

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### **Abstract**

The world we live in is full of fascinating perspectives. One perspective that is rarely heard of or researched is a phenomenon called synaesthesia. Those possessing this unique capability experience an overlap of the senses, usually through sight and sound, but sometimes through touch and taste as well. This ability is unusual, affecting only one in two thousand people (Sacks, 2007). Despite its rarity, synaesthesia offers fresh perspectives in terms of how humans approach and interact with written and spoken language, sounds, tastes, and emotions. Most of the research to date has focused on synaesthesia as it relates to sound, specifically music. The research and analysis conducted within this project broadens the range of what is known about synaesthesia through general research and interviews with synaesthetes. The findings provide an opportunity to enrich personal experiences through the perspectives of synaesthetes.

### **Acknowledgements**

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I would like to thank all those who graciously volunteered their time and personal experiences during the interview process. Their input about their synaesthetic abilities was fascinating as well as essential. This project would not be possible without their cooperation.

I would like to thank my family and friends who encouraged me to remain dedicated and determined until the end.

### **Author's Statement**

The topic of synaesthesia is not directly related to my fields of study: special education and piano. However, I feel as though it is an important topic that can contribute positive and beneficial thought processes and ideas to the field of special education. Special education is a career that requires patience, dedication, and above all creativity. Students requiring special services need to be understood and then given new angles in order to achieve what may be easily understood by other students. Not every student will experience the world in the same way, especially those affected by disabilities. One of the many responsibilities of special education teachers is discovering how to reach these students through non-traditional approaches. The research and analysis completed through this project allowed me to express and explore the importance of being open to new ideas and interpretations. Fresh perspectives of approaching and experiencing the world may encourage the success of students in special education.

## Introduction

The modern English language is full of associations between the five senses, feelings, and colors, many of which do not make much sense. “She was green with envy.” “That pie smells so good I can almost taste it.” “The issue is not as simple as black and white.” When looked at in isolation and truly analyzed for their meaning, these sayings are not based on true experiences, or are they? A small percentage of the human population, around one in two thousand are estimated to possess synaesthetic tendencies. This number may actually be underestimated due to the belief of it being a “normal” characteristic for many (Sacks, 2007). The Merriam- Webster Dictionary defines synaesthesia as “a concomitant sensation; especially: a subjective sensation or image of a sense (as of color) other than the one (as of sound) being stimulated. Essentially, this ability is a blending of the senses. A second definition by Cytowic as quoted by Steen (2001) defines synaesthesia as

an involuntary joining in which the real information (received by) one sense is accompanied by a perception in another sense. In addition to being involuntary, this additional perception is regarded by the synaesthete as real, often outside the body, instead of imagined in the mind’s eye (p. 203).

Through this definition, we can see that synaesthesia exists naturally and cannot be controlled. Cytowic also maintains that these tendencies rebel against the developmental nature of humans. As humans grow and develop, the brain naturally separates the senses so they function quite independently (Steen, 2001). Those with synaesthetic brains have retained some of these original connections for reasons somewhat unknown. One possible explanation is the *sensory leakage* hypothesis. This theory proposes that

information can be passed between sensory modes in the brain when the connections are not completely developed during the fetal stage of humans (Martino & Marks, 2001). This form of synaesthesia, where information is passed easily and subconsciously between the senses is referred to as *strong synaesthesia*. The atypical formation of the senses has the ability of fostering more brain awareness and activity related to memory, emotion, reasoning, and perception (Martino & Marks, 2001). A second form, *weak synaesthesia* is based more on perceptions and attentiveness, rather than a developmental anomaly. These people appreciate and foster connections between senses. Some studies have shown that those without strong synaesthetic abilities are still able to understand and appreciate the connections that can be formed between the senses (Martino & Marks, 2001). An example of this awareness can be seen in the English language. We utilize sayings such as a “sweet smell” or a “warm color” which have the ability of creating connections, even subconsciously. The association between senses is metaphorical rather than literal, as in strong synaesthetes (Martino & Marks, 2001).

Despite the rarity of synaesthesia, it has been recorded and referenced several times throughout history. The earliest recorded incident was discovered and recorded in 1883. *Inquiries into Human Faculty and Its Development*, written by Francis Galton discussed research subjects able to consistently associate colors with numbers (Sacks, 2007). Since then, various artists, writers, and composers have either utilized synaesthetic tendencies or have been influenced by the abilities of others. Music has played an especially large role in recognizing and understanding synaesthesia, chiefly because many synaesthetic experiences are triggered aurally. Two of the most noted musicians with synaesthetic abilities were Alexander Scriabin and Nikolai Rimsky-



Korsakov (Harrison & Baron-Cohen, 1994). Scriabin's *Prometheus* utilized an instrument he invented himself called the "color organ." Instead of producing musical notes, this instrument would actually produce unique colors for the keys that were played. The colors were paired with particular notes and projected onto a screen to be experienced by the audience. Olivier Messiaen and Franz Liszt have also been noted to make comments related to color and music. For example, Liszt asked for "more pink here, if you please" while conducting an orchestra (Harrison & Baron-Cohen, 1994, p. 343).

Within the field of literature, few writers actually utilize synaesthetic tendencies, but rather are influenced by the abilities of others. One of the few, Andrea Newman is a modern day author. She actually selects words based on their color and how they fit best with the rest of the words and colors in a sentence. In addition, character names are chosen based on the strength of the color and the character's personality. Other than these rare examples, authors use colors in their writing to more clearly illustrate the image they are trying to project. Harrison and Baron-Cohen use the writings of an author to solidify this concept. Byatt wrote "scarlet like the scream of someone falling through a skylight" in his novel, *Still Life* (Harrison & Baron-Cohen, 1994, p. 344).

The artist Carol Steen, provides a firsthand look into how art is influenced by synaesthesia. The paintings and sculptures she creates are based on visualizations triggered by sound, taste, smell, and pain. Colors, shapes, and textures may be present in a variety of combinations. Steen specifically utilizes colors in painting and shapes in sculpting (Steen, 2001).

Despite the medium, synaesthetic experiences provide a unique way of interacting with the world. One of the most unique characteristics of synaesthesia is that it utilizes several of the body's senses not only simultaneously, but in overlapping ways (Donnell & Duignan, 1977). According to Donnell-Kotrozo (1978), people learn the best when they are given opportunities to experience the world with all of their senses. An example provided to illustrate this idea is viewing paintings. Rather than simply looking at them, people should be taught to smell the paint and feel the texture of the finished product to enhance the entire experience. When we are able to use all the senses in such a way, they become united and similar in nature (Donnell-Kotrozo, 1978). One potential use for information related to synaesthesia is through education. Some researchers, such as Appleby (1974) and Donnell-Kotrozo (1978), are proponents for using this combination of the senses in education. Synaesthetic education involves creating a solid foundation for students to experience subject material with all their senses. The goal becomes a response, with no answers being incorrect since they are based wholly on perception. Students are able to learn better when given these types of opportunities because they are interacting with the world using all of their senses as opposed to thought processes only (Donnell-Kotrozo, 1978). These ideas demonstrate one possible use of synaesthetic experiences.

Donnell-Kotrozo conducted research in classrooms with non-synaesthetic students to study the effect of synaesthetic experiences on students. She found that students in all grades involved had positive experiences when color associations were incorporated (Donnell-Kotrozo, 1978). As mentioned previously, weak synaesthetes have the ability of appreciating synaesthetic experiences, even if they are based on

cultural perceptions rather than actual experiences (Martino & Marks, 2001). The study conducted by Donnell-Kotrozo indicated that non-synaesthetes, even at a young age, possess the same type of appreciation for synaesthetic experiences. Incorporating synaesthesia into education allows students to experience the world through their senses and understand it in a variety of ways (Appleby, 1974).

Currently, most research on synaesthesia is focused on creative subjects, such as art (Andrews, 1982; Okada, 2003) and music (Donnell-Kotrozo, 1978). In addition, much of the research is more aligned with article reviews and commentaries. Only a small amount of research actually delves into how experiences can shape the lives of synaesthetes. That which is available is often dated and not current. Therefore, the purpose of this research study is to explore how synaesthesia impacts the lives of those who experience this sensory overlap on a daily basis. Synaesthetes do not usually pay close attention to their abilities because synaesthesia has become so far entwined with their daily lives. They do not pay attention to how synaesthesia is impacting their lives because it has become a natural part of who they are and how they interact with the world. The nature of synaesthesia as well as the differences between experiences will be used to guide and strengthen how synaesthetic experiences play a role. In addition, the potential for synaesthetic experiences will be explored. When synaesthetes are paying attention to their abilities, they are often able to utilize them in unique ways. This study will explore how experiences either help or hinder those with synaesthesia. Once the potential for information related to synaesthesia is researched, perhaps we can more fully understand how synaesthetic abilities can impact non-synaesthetes. The questions guiding this research study are:

1. What are the experiences of synaesthesia?
2. How does synaesthesia affect various aspects of synaesthetes' lives?
3. How have synaesthetes utilized their potential within the realm of synaesthesia?
4. How does synaesthesia help or hinder synaesthetes in their everyday life?

### **Literature Review**

The phenomenologist Maurice Merleau-Ponty wrote in *Phenomenology of Perception*, “Synaesthetic perception is the rule, and we are unaware of it only because scientific knowledge shifts the centre of gravity of experiences, so that we unlearn how to see, hear, and generally speaking, feel” (Harrison & Baron-Cohen, 1994, p. 345). Synaesthetes are unique in that they have not lost this perception of experiencing the world in a multimodal way. All of their experiences are tainted with an added sense layer. Whether their synaesthesia manifests itself in colors, tastes, shapes, or objects, it adds a dimension onto what they are experiencing at the time. This phenomenon has been fascinating to many researchers throughout the years. Different types of synaesthesia as well as how they are utilized in everyday life have been studied by a variety of professionals, such as psychologists, neurologists, musicologists, and artists. The more current research that does exist offers more explanation as to how and why synaesthesia occurs. However, the potential widespread use for the information is a more modern discovery. True synaesthetic experiences are full of possibility, but what non or weak synaesthetes can learn from strong synaesthetes is a more recent development that is still being explored.

Oliver Sacks, a musicologist explores the topic of musical synaesthesia in some of his writings (2007). Two of the subjects who participated in Sacks research possess a very similar type of synaesthesia (2007). These two males both associate unique colors with specific musical keys. The colors that Michael experiences have been fixed for as long as he can remember, but there is not any apparent system or logic behind the associations. The only explanation that may play a role is a toy piano with colored keys he had as a young child. Sharp and flat keys even have the ability of slightly altering the color he sees, although they stay within the same color family (Sacks, 2007). Most of the colors are “normal,” as we would perceive them, but some are not observable in the world around us. Michael experiences the colors “like a screen” in front of him, but they do not mix with the actual colors of objects around him (Sacks, 2007, p. 170). This type of colored hearing is one type of Michael’s synaesthesia. He also sees letters, numbers, and days of the week as particular colors. Certain topographical landscapes are assigned to them as well. For example, “At 20, (the numbers) take a sharp turn to the right, at 100 a sharp turn to the left” (Sacks, 2007, p.171). The second research subject, David, experiences colored hearing in a very similar way, except that the colors associated with keys are based upon the instruments that share the same key. For example, he described the key of B-flat as “clear and golden,” perhaps because brass instruments such as the trumpets or trombones are tuned to the key of B-flat (Sacks, 2007, p.172).

A second type of musical synaesthesia that was originally introduced by *Nature* magazine was quoted in Sacks writing (2007). One musician associates tastes with musical intervals. For example, minor seconds are sour, major thirds are salty, fifths taste like pure water, and minor sixths taste like cream, etcetera (Sacks, 2007). When she is

uncertain about what she is processing through hearing, such as if an instrument is sharp or flat, she utilizes her sense of taste to solidify what she hears (Sacks, 2007).

Sacks also researched a type of synaesthesia that deals with associations between music and shape. Sue experiences synaesthesia with “light, shape, and position” (Sacks, 2007, p.177). She is able to see colors but does not create distinct associations. Certain instruments, groups of notes, or melodic lines will evoke dynamic movement of shapes, spirals, bars, and changing colors. These visualizations are seen in front of her, similar to how Michael experiences synaesthesia (Sacks, 2007). Overall, Sack’s research is interesting and in-depth. Despite the fact that all of his research is focused on musical synaesthesia, he still presents a wide range of synaesthetic tendencies. Some of the participants shared how they utilize synaesthetic tendencies for composing music. It would have been interesting if Sacks had delved farther into this potential and how or if it has impacted the lives of others, especially non-synaesthetes.

The author Richard Cytowic is a neurologist who has completed research about the nature of synaesthesia, its origin, and synaesthetes themselves (1993). One particular research participant “tasted” shapes when he ate. During an experiment, Cytowic would squirt different tasting solutions into Michael’s mouth and would then ask Michael to describe what he tasted or experienced. Michael attempted to explain what happens when he experiences a strong taste (Cytowic, 1993). A particular feeling moves throughout his body, specifically down into his hands. When this happens, he is able to actually feel an object that is “resting” in his hands. Nothing is there, but the sensation is so strong that Michael has used description such as “It has the springy consistency of a mushroom, almost round” and “There are leafy tendril-like things coming out of the

holes” to describe the bitter taste of quinine (Cytowic, 1993, p. 64-65). The shapes he feels are also dynamic, changing with the taste itself. One example he offered was sweet and sour sauce. He is able to experience different shapes as the taste changes from sweet to sour (Cytowic, 1993). Cytowic presents a very comprehensive overview of synaesthesia in addition to his actual study involving synaesthetes. His research was completed well due to the depth of experiments he conducted and questions he asked. His writings include a wide variety of sources as well as a critical look at the nature and implications of synaesthesia. It is also beneficial in that he relates the material to non-synaesthetes through easy to understand explanations and examples.

A more modern synaesthete, Carol Steen, has shared her strong synaesthetic experiences through articles and the art she creates (2001). Her experiences are evoked from touch, loud sounds, smells, tastes, and pain. Changing shapes and colors are present in front of her as long as the trigger is present. Once the sound, smell, or pain recedes, her visualizations will disappear. To her, it is important for people to be aware of the many ways the world can be experienced, especially as related to unique perceptions or approaches. She has chosen to share her synaesthetic qualities with others because she believes it will help them (Steen, 2001). For those who experience strong synaesthesia, experiences can form a common bond between them. For those with weak synaesthesia, her experiences can encourage new perceptions and explorations. She believes that sharing these perceptions with each other can become a way of experiencing the world together in a “beautiful” way (Steen, 2001, p. 208). The author ends the article with a rationale as to why she shares her experiences. However, she does not indicate if her art or articles have impacted anyone, synaesthetic or not. This information would be

beneficial in that it would allow non-synaesthetes to understand how synaesthetic experiences, can play a role experiencing the world more fully. If those who are not synaesthetic have gained a greater appreciation or understanding from her experiences, perhaps the same will hold true for all synaesthetes who decide to share their experiences with others.

A review written by Martino & Marks (2001) outlines how these different types of synaesthesia can manifest themselves in various forms and degrees of intensity. Strong synaesthesia occurs when a strong, clear image is experienced by one sense when a different sense is stimulated. Weak synaesthesia deals more with a general overlap of senses. It can occur through perceptions, exchange of information, and language modalities. Despite these differences, it is believed that the same processes in the brain govern both types (Martino & Marks, 2001). In the case of strong synaesthesia, the ratio of genders is 6:1, females to males. In addition, it occurs in approximately 1 out of every 2,000 people. Strong synaesthesia has been found to be common within families, leading scientists to believe that it is linked to genetics (Martino & Marks, 2001). The associations strong synaesthetes create between modalities are idiosyncratic in nature, unique to that one person. In addition, the experiences are described as “simple (e.g. consist of a color or shape) but dynamic (e.g. as the inducer waxes and wanes, so does the image)” (Martino & Marks, 2001, p. 62). With strong synaesthesia, the relationship between senses is “unidirectional.” For example, if a sound produces a distinct color, that color will not produce sound for the synaesthete (Martino & Marks, 2001). This article presents an interesting viewpoint in that it categorizes those who experience synaesthesia by the intensity of experiences. However, the author does not indicate what



the potential for the information is. No suggestions were given for using these differences in a constructive way. Since the majority of people are not strong synaesthetes, understanding the connections of weak synaesthesia that are created through cultural associations would create a greater awareness of how non or weak synaesthetes can learn from strong synaesthetes.

A study was conducted by Donnell-Kotrozo (1978) to determine how students within a range of grade levels can experience synaesthesia through “colored hearing” tasks and learn from the concepts surrounding the phenomenon. In the article, Donnell-Kotrozo discusses how our modern language is full of color associations. For example, “We speak of seeing red in anger, of feeling blue in sorrow, or being green with envy” (Donnell-Kotrozo, 1978, p. 33). These color associations provide a connection to how the world is experienced. The author states that humans innately experience the world through all senses. “Rain is not only felt, but heard, smelled, seen, and tasted” (Donnell-Kotrozo, 1978, p. 35). Reducing knowledge to one or two of the senses robs people of experiencing life and the world in a myriad of ways that are unique to them (Donnell-Kotrozo, 1978). To research how well students respond to this type of education, a study was conducted with students in grades one through seven. Students were given the task of relating music to personal experiences or colors. Most seemed more open and willing to connect with the material than if it had simply been a direct lesson (Donnell-Kotrozo, 1978). In the study, grades one through three were asked to pair a list of given colors with various musical selections. Grades four through seven were asked to write responses to music that was played. The responses could include descriptions such as color, shape, taste, physical sensations, and smells. The majority of students understood

the assignment and completed it seriously. Almost all seemed invested in the tasks. Some students struggled with separating preconceived perceptions with their individual experiences. (Donnell-Kotrozo, 1978). This study provided a good foundation for exploring the possibilities of synaesthesia. In studying the impact of synaesthesia, they found that students of all ages respond well to tasks involving color and with a wider range of possible correct answers. However, the study did not address different types of synaesthetic experiences. The only focus of the study was “colored hearing.” Students were not truly introduced to various ways of approaching tasks synaesthetically. In addition, there was no evidence of follow-up after the study was conducted. If people are going to use synaesthetic knowledge or experience constructively, there must be some type of follow-up to solidify concepts.

Research similar to Donnell-Kotrozo’s (1978) was conducted by Okada to study music and color associations. The first informal study was to assess color hearing. The author describes this as the ability to connect vision with hearing, as well as incorporating imagination in the process (Okada, 2003). For the study, the author used university students who attended his lectures at Shinshu University. No other specific information was used to define the participants in terms of age, gender, or background (Okada, 2003). The author blew into a toy bugle, creating a long even tone that diminished at the end before it disappeared. Students were instructed to close their eyes while the note is being played. Afterward, they fill out a short survey. The questions included:

Did you see color? and What color?

If you saw or felt a color by hearing tone, describe its name and what happened.

Describe your experience.

The possible answers were:

1. I saw real color
2. I strongly felt color
3. I somehow felt color
4. I didn't feel any color (Okada, 2003)

In the first experiment, most students answered the questions using twos or threes. The author claims that there was a fairly good response for the first study because students have grown up in a world and culture where they are inundated with color accompanying sound, such as TV, cell phones, and computers to name a few (Okada, 2003). This research was successful in demonstrating the possibilities of colored hearing, and thus synaesthesia. Almost all students, whether possessing synaesthetic abilities or not, responded to music in ways that indicated that some sense of color was experienced (Okada, 2003). However, this study did not extend past the questionnaire. The author did not discuss how or if these results were used by students. It is not known whether the information learned through this study was beneficial in any way, either inside or outside of the classroom. If used constructively, the results from this study could have impacted how the participants approach and experience the world around them.

Researchers such as Appleby are proponents for utilizing these synaesthetic experiences for learning (1974). Although a particular article by Appleby focuses on how synaesthesia plays a role in education, the foundational ideas are focused on experiencing and connecting with the world in a variety of ways. The ideas he discussed throughout the article provide possibilities for utilizing information related to synaesthesia. As humans mature, they are strongly encouraged to view the world from a

more analytical and conceptual viewpoint. They learn to recognize concepts visually and classify experiences at home and then later on in the school environment. In school, a large emphasis is placed on the visual and auditory learning processes, further deadening the potential for the use of the other three senses (Appleby, 1974). This process becomes a cycle because adults in that child's world matured in the same way. Learning concepts in general are aligned with a logical, linear method (Appleby, 1974). From a young age, children are taught to "conceptualize" in order to make sense of the world around them (Flannery, 1973). Doing so is helpful in that the world is more logical, however, it reduces the unique characteristics of each person, object, or experience. The world is looked at in terms of its categories rather than the unique facets of each component (Flannery, 1973). Appleby, on the other hand, proposes that people should be taught to learn through their senses. Meaning comes not only through the mind in the form of facts, it is also learned through all of the senses in a more experiential way. By being an involved participant, knowledge then becomes an intrinsic part of that person (Appleby, 1974). Despite these benefits, Appleby believes synaesthesia cannot be taught. It must be introduced and continually encouraged so it can be appreciated and eventually utilized (1974). "Synaesthesia is a way of perceiving, and therefore a way of knowing and learning" (Appleby, 1974, p.25). With synaesthesia, people are able to approach the world much more openly, accepting the aspects of each experience and assimilating them into their knowledge. People are able to actively participate in the process of learning and maturing (Appleby, 1974). This article offers great insight into understanding the synaesthetic way of approaching the world. The ideas are broad enough to incorporate a variety of subjects and clear enough that they can be understood by a wide range of

people. However, the author does not relate the information to different types of synaesthesia. Specific examples of synaesthetic experiences were not used in the article. In addition, the foundational ideas would be strengthened if the author offered examples of how synaesthesia could actually be used.

In a similar article by Aldridge, the potential for using more inclusive methods of understanding the world are outlined (1992). Learning a word as a word is not as important as experiencing it on a more personal level. The way to understand what truly lies between all of these “words” is experience. “Unless the person learning a term first has had experience with the phenomenon the term represents, in its various contexts, a word for the term is meaningless” (Aldridge, 1992, p. 14). Even Albert Einstein experienced concepts before they became the mathematical equations they are today (Root-Bernstein, 2001). In the beginning stages of thought processes, he “felt or visualized the answers” (Root-Bernstein, 2001, p. 65)). Through experience, people learn to construct concepts to understand the material in a more idiosyncratic way, making them more successful in grasping meaning and acquiring knowledge (Aldridge, 1992). This article is positive in that it outlines how hands-on type experiences can be used in the classroom. However, the main focus is on science education. The theory behind the article is strong in that it produces people who can approach the world in a variety of ways and are better at understanding it. The article would have been strengthened if the author used this theory in relation to synaesthesia. Synaesthesia could actually be considered the foundation of his ideas, but it is rarely if ever mentioned. When his ideas are looked at in conjunction with synaesthesia, the possibilities for understanding and utilizing synaesthetic experiences become more of a reality.

Everything in the world around us can be experienced by more than one sense, but we have often matured to the point of only enabling one or two of our senses, such as sight or hearing. When we are given the opportunity to learn with all of our senses, we are more prepared to approach and understand experiences (Donnell-Kotrozo, 1978).

Growing up, many of our experiences are based on the facts. As Appleby (1974) states,

Any basic physics text will tell us that it is composed of one part oxygen and two parts hydrogen, with a freezing point of 32 degrees and a boiling point of 212 degrees Fahrenheit. What the book cannot tell us is the smooth, cool feeling of water running through our fingers or the sensation of buoyancy as we swim in it, the sound of water tumbling over stones in a brook, the magic sparkle of raindrops on a window pane, the re symmetrical beauty of a reflected shimmer of a sunset across a lake, or the perfectly symmetrical beauty of a single snowflake (p. 25).

Synaesthetes are the small, privileged population who can naturally and simultaneously utilize more than one sense. However, they are not usually aware of their experiences and how they play a role. Synaesthesia has simply become a part of them as a person. The purpose of this study is to investigate how synaesthetic abilities impact the lives of those with synaesthesia. The differences between synaesthetes and their experiences will also be examined to strengthen the impact of synaesthesia on each person. In addition, the possibilities for using synaesthesia will be explored, as well how these uses either help or hinder synaesthetes. Once this information is researched and understood, synaesthetes may offer valuable insight to non-synaesthetes about experiencing and enjoying the world in a more comprehensive way. Perhaps viewing the world through

the eyes of synaesthetes will allow non-synaesthetes to understand and appreciate the world and better and new ways. The questions guiding this research study are:

1. What are the experiences of synaesthesia?
2. How does synaesthesia affect various aspects of synaesthetes' lives?
3. How have synaesthetes utilized their potential within the realm of synaesthesia?
4. How does synaesthesia help or hinder synaesthetes in their everyday life?

## **Method**

### **Participants**

There were four participants for the current study. The participants were recruited through the use of flyers posted in various locations at a mid-western university. Two of the participants were females between the ages of 20 and 25. The other two were males between the ages of 30 and 50. The females were both students at a university. The 30-year old male was a composer of music as well as a conductor of a choir. The profession of the 50-year old male was unknown. In addition this participant was the father of one of the female participants. All research participants were from the Midwest region of the United States.

### **Procedure**

Once the participants were recruited through flyers, the study was fully explained to them and afterwards they each signed the consent form to participate in the study. To conduct the study, the researcher interviewed each participant individually. Interviews took place in a private room on campus after permission was acquired. Participants were briefed about the types of questions involved, how long it would last, and options for

rescinding what they shared. Each interview took approximately 20- 30 minutes to complete and consisted of 10 research questions. Please see Appendix A for a full list of the interview questions. The construction of the interview questions was used to gather general information about each participant's synaesthetic experiences and was guided in part by the literature review.

### **Instrument**

The questions used for the interviews were written by the researcher. They were not taken from any existing studies. A total of ten questions were used during the interviews. Three of the questions are focused on how the research participant experiences synaesthesia, including varying degrees of intensity, and certain 'triggers' that can either activate or affect the nature of synaesthetic experiences. Two questions touch on the background of synaesthetic experiences. Participants were asked how long they had experienced synaesthesia and if it had ever changed over time. One question was asked to ascertain how participants felt about the experiences and another dealt with their level of control over the experiences. In other words, whether they viewed synaesthesia as a subconscious or a conscious process. The last three questions asked during the interview process were concerning how synaesthesia impacts participants in everyday life. In addition, the questions asked for details concerning how participants have utilized their potential within the realm of synaesthesia. See Appendix A for a complete list of the interview questions.

### **Data Analysis**

After the interviews were conducted, the data was analyzed based on the open-ended responses given by each participant. In addition the responses were also analyzed



based on the research questions. Approaching the answers in this manner allowed the researcher to better organize the information that was being shared. The researcher attempted to create themes from the responses but there was not enough cohesion between the responses of participants to do so. The answers given were too individualized and expressed characteristics and opinions unique to that one participant

## **Results**

### **How do you experience synaesthesia?**

All four of the participants experience a type of synaesthesia that is triggered visually. The first research participant also experiences auditory synaesthesia that is triggered by music. When listening to a piece of music, an instrument, or a voice, colors will appear. The colors last only as long as the music or voice continues. They disappear when the voice ceases. Although all participants experience visual synaesthesia, it varies between participants. The first and fourth participants reported that their synaesthetic abilities are related to letters and numbers. Digits and letters will appear consistently as colors when printed on a page. The fourth participant experiences synaesthesia related moods in addition to letters and numbers. Colors influence her feelings or emotions and vice versa. The second research participant reported that he experiences synaesthesia through letters and sometimes texture, although textures are much more infrequent than letters. He also reported that his experiences are relatively weak, with many letters appearing to have gray overtones that accompany the colors. It is interesting to note that numbers spelled out using letters appear colored, but the numeral itself is not affected. For example, “11” has no color, but the word “eleven” is golden in hue. The third participant reported that she experiences synaesthesia through visual texture as well, but

with whole words as opposed to individual letters. Often, the combination of colors and texture will give shape to unique letters. Textures can even be impacted by how the word is pronounced or the sound of it. For example, “w” appears smooth to her and may cause the rest of the word to appear smooth if it is the first letter of a word. The pronunciation of letters also impacts the color or texture of a word. She offered an example using the color word “green.” It should be dark blue because of the letter combinations, however, she experiences it as green since that is what the word represents.

### **How does synaesthesia affect various aspects of your life?**

The first research participant composes music. He reported that he utilizes combinations of timbres and sounds to create a “color or mood” when composing music. Specific instruments are used to create overtones within the music. In addition, he uses the purity of the colors he sees to determine if notes are in or out of tune. The more vibrant the color, the purer the tone is. This is especially beneficial when he is directing choirs. He does not have to rely on artificial devices to tune and lead those singing. The second research participant reported that synaesthesia had very little effect on his everyday life. The only influence he shared was naming his daughters based on his preferences for the colors of some names. The third research participant also shared very little about how synaesthesia affects her life. The only effect she named was a tendency for experiences to be irritating due to the incongruence between colored words or letters in the English language and how these same letters appear to be other colors in a different language or system. The fourth participant reported that life is more interesting to her because of her synaesthetic experiences. She enjoys seeing the duality of the actual colors of objects and how she perceives them. In addition, she is able to influence her

mood based on particular colors, especially as it pertains to clothing. Synaesthesia impacts her wardrobe selections because certain colors, such as blue, are calming and relaxing. This counteracts her easily excited mood which can be magnified by warm colors such as red and yellow.

### **How have you utilized your potential within the realm of synaesthesia?**

The first participant stated that synaesthesia is utilized to determine if a choir is in tune. If the colors are clear and vibrant, the tones are pure and on key. If the colors appear to be splotchy or have gray overtones, he knows that some members of the choir are out of tune. For this reason, synaesthesia helps him in everyday life. He does not view it as a hindrance in any way. Additionally, this participant uses synaesthesia as a memory device, pairing colors and dates to remember important information, especially dates, phone numbers, and spelling. The second participant shared that he has not utilized any synaesthetic tendencies. Therefore, synaesthesia has neither helped nor hindered him. The third research participant stated that she uses synaesthesia as a memory device. She is able to remember color associations which make information easier and quicker to recall. This participant shared that she usually has a weak short-term memory. However, synaesthesia allows her to remember vocabulary and lists fairly easily. In these instances, it is the visual layout of the words that triggers her memory. Outside of memorization, she believes synaesthesia neither helps nor hinders her as well. At times, tasks can be unpleasant if letter color associations are not congruent with what she sees. The fourth research participant responded that she utilizes color-coding to match her mood. For example, since her favorite color is blue, she often pairs blue notebooks or folders with her favorite classes. Overall however, she stated that

synaesthesia neither helps nor hinders her in everyday life. She utilizes synaesthesia along the lines of preferences rather than as a tool.

## **Conclusion**

Through the course of this study, current and more comprehensive information has been collected and analyzed. As seen from the results outlined above, those who took part in this research study all experience synaesthesia in slightly different ways. Even minor changes between people can play a large role in how they experience and utilize synaesthesia differently. The participants in this study shared a wide variety of examples concerning the effect of synaesthesia on their everyday lives. These ranged from composing and directing choirs, to memory devices, and clothing choices. As with synaesthetes quoted in other research, those who participated in this study have become accustomed to the experiences that have been happening for as long as all of them can remember (Cytowic, 1993). Along the way, however, synaesthetic experiences have shaped some of their everyday lives through decisions within careers and small choices such as clothing. Experiences are not invasive since they have become a natural part of the synaesthete, but they play a role nonetheless. The size of this role is also influenced by the person's attitude and abilities. Despite what type of synaesthesia is present, experiences have the potential of being magnified by a higher degree of concentration or attention. For those with a weaker form of synaesthesia, such as the second research participant, experiences may not intensify, but can be approached differently due to attitude. While some participants shared that they felt neutral about experiences, others stated that they enjoyed them or appreciated the extra dimension it brought to everyday

life. So although synaesthesia may remain weak and non-pervasive, it can still play a role in how everyday life experiences are viewed and interpreted.

In conclusion, synaesthesia is a highly individualized ability that is impacted and utilized differently by each synaesthete. Similar experiences or types of this phenomenon will not always be experienced in the same way by synaesthetes. There is a great deal of potential and opportunity for synaesthesia to be utilized, but the choice belongs to the synaesthete as to whether experiences will enhance appreciation, be used as a functional tool, or have no impact at all. Despite what that decision may be, each synaesthete possesses a unique way of approaching and understanding the world. It may not be a huge deviation from what non-synaesthetes experience, but it is a deviation just the same. For this reason, synaesthesia deserves a second look and a deeper exploration for those devoid of these experiences. The abilities of others are often unique from our own, offering fresh perspectives. These differences in potential should not become a point of division. Rather, we should utilize this wonderful variety to enhance our understanding of the life around us.

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## **Appendix A**

### Interview Questions:

- How do you experience synaesthesia?
- How do you feel about these experiences?
- Are there varying degrees of intensity when you experience it?
- Are there certain 'triggers' that stimulate experiences?
- How long have you experienced it?
- Have you always experienced it the same way or has it changed over time?
- Do you consider synaesthesia as a subconscious process or as something you can control? Why?
- How does synaesthesia affect various aspects of your life?
- How have you utilized your potential within the realm of synaesthesia?
- How does synaesthesia help or hinder you in every day life?

## HUMAN SUBJECTS RESEARCH APPLICATION

Protocol title: Synaesthesia

Proposed project dates: begin: January 1, 2011 end: December 17, 2011

Principal Investigator: Rachel Buskavitz E-mail: rabuskavitz@bsu.edu

Department: \_\_\_\_\_ Telephone: 812-455-3144

(check all that apply) ☐ Faculty/Staff ☐ Graduate student ☒ Undergraduate student ☐ Unaffiliated

(If the PI is a student researcher or not affiliated with Ball State University, a Faculty Sponsor must be listed below.)

Faculty Sponsor: Dr. Winnie Mucherah E-mail: wmucherah@bsu.edu

Department: Educational Psychology Telephone: 765-285-8514

If this project is funded or if the investigator is seeking funding, list the agency(s) and/or sources.

(If the title of the grant application differs from the title of the IRB protocol, also specify the grant application title.)

To comply with the federally-mandated educational requirement, you (and all Key Personnel for this project – including the faculty advisor/sponsor) must have completed the online tutorial on the protection of human subjects. A copy of the computer-generated certificate indicating your successful completion of this tutorial must either be uploaded with this application or be on record in the Office of Academic Research and Sponsored Programs.

Have you and all Key Personnel completed this online tutorial? ☐ Yes ☒ No

### Principal Investigator Assurance Statement

I have read and understand Ball State University's "Policy for the Protection of Human Subjects in Research" as stated in the *Faculty and Professional Personnel Handbook*, and I agree:

- a) to accept responsibility for the scientific and ethical conduct of this research study,
- b) to obtain IRB approval prior to revising or altering the research protocol or the approved Informed Consent text, and
- c) to report immediately to the IRB any serious adverse events and/or unanticipated problems which occur as a result of this study.

The Principal Investigator must electronically sign this study prior to submitting the protocol to the IRB for review. When you sign this study as the Principal Investigator, you are also agreeing to the terms in the Principal Investigator Assurance Statement above.



### Faculty Sponsor Assurance Statement

As the Faculty Sponsor for this study, I certify that I have reviewed this protocol and affirm the merit of this research project and the competency of the investigator(s) to conduct the project. My involvement in this study is as follows (check one option):

- ☒ I will be involved in this project. My name is listed and my responsibilities (described in the Key Personnel section) include supervision and oversight of this project.
- ☐ I will be involved in this project. My name is listed and my responsibilities (described in the Key Personnel section) in this project are limited (e.g., data analysis only). I affirm that this investigator has the competency to conduct this research study without my supervision or that of any other faculty or staff member of Ball State University.
- ☐ I will not be involved in any aspect of this project (including data collection). However, I have reviewed this protocol and the investigator's research experience and expertise. I affirm that this investigator has the competency to conduct this research study without my supervision or that of any other faculty or staff member of Ball State University.

A Faculty Sponsor must electronically sign this study for all student research projects and for all persons not affiliated with Ball State University before the protocol is submitted to the IRB for review. When you sign this study as the Faculty Sponsor, you are also agreeing to the terms in the Faculty Sponsor Assurance Statement above and accepting responsibility for ensuring that the terms of the Principal Investigator Assurance Statement are met.

### Key Personnel

List all persons, other than the PI, who will have a role in the research project (refer to an attachment if necessary):

Name:	<u>Dr. Winnie Mucherah</u>	<div>Faculty/Staff</div>
Department:	<u>Educational Psychology</u>	
Responsibilities:	<u>Advising, Editing, Revising (Faculty Advisor)</u>	
Name:		<div>Select one</div>
Department:		
Responsibilities:		
Name:		<div>Select one</div>
Department:		
Responsibilities:		
Name:		<div>Select one</div>
Department:		
Responsibilities:		

---

### Subject Population

Check all categories that apply to the subjects:

- |   |  |
|---|--|
| <input type="checkbox"/> Cognitively impaired                   | <input type="checkbox"/> Pregnant women      |
| <input type="checkbox"/> Minors (individual under age 18 years) | <input type="checkbox"/> Prisoners           |
| <input type="checkbox"/> Normal healthy volunteers              | <input checked="" type="checkbox"/> Students |
| <input type="checkbox"/> Patients/clients                       | <input type="checkbox"/> Student athletes    |
| <input type="checkbox"/> Other, explain: _____                  |  |

Will information pertaining to the research be withheld from subjects (incomplete disclosure/deception)? ☐ Yes ☒ No  
If yes, for what purpose? \_\_\_\_\_

List the location(s) where the research will be conducted: Ball State Campus, Bracken Library, Room 104

If advertisements will be used to recruit subjects, indicate the format(s) to be used:

- |  |   |
|--|---|
| <input checked="" type="checkbox"/> Flyer                  | <input type="checkbox"/> Radio                                    |
| <input type="checkbox"/> Newspaper                         | <input type="checkbox"/> Television (e.g., public access channel) |
| <input type="checkbox"/> Electronic media, describe: _____ |   |
| <input type="checkbox"/> Other, describe: _____            |   |

---

### Collaborators and Permissions

If any part of the research is to be conducted at another institution with a collaborator, provide the following information for the research collaborator:

Name: \_\_\_\_\_  
Title: \_\_\_\_\_  
E-mail: \_\_\_\_\_ Telephone: \_\_\_\_\_  
Address:

If any part of the research is to be conducted at an institution, or in conjunction with another organization, other than Ball State University, provide the name and contact information for a person who is authorized to give permission to conduct the research. Generally, this will be the person who would write a letter of permission to conduct the research.

Name: \_\_\_\_\_  
Title: \_\_\_\_\_  
E-mail: \_\_\_\_\_ Telephone: \_\_\_\_\_  
Address:

Date: 01/26/2011 12:12 PM

To: "Wilfridah Mucherah" <wmucherah@bsu.edu>, "Rachel Buskavitz" <rabuskavitz@bsu.edu>

From: "Chris Mangelli" <no-reply@irbnet.org> Reply To: "Chris Mangelli" <cmmangelli@bsu.edu>

Subject: IRBNet Board Action

Please note that Ball State University IRB has taken the following action on IRBNet:

Project Title: [196102-1] Synaesthesia

Principal Investigator: Rachel Buskavitz

Submission Type: New Project

Date Submitted: October 31, 2010

Action: APPROVED

Effective Date: January 26, 2011

Review Type: Expedited Review

Should you have any questions you may contact Chris Mangelli at [cmmangelli@bsu.edu](mailto:cmmangelli@bsu.edu).

Thank you,

The IRBNet Support Team

[www.irbnet.org](http://www.irbnet.org)

## **Section I: Title, Purpose of the Study, and Rationale**

**1. Title:** Synaesthesia

**2. Purpose of the Study:** The purpose of this study is to explore synaesthesia and the various effects it has on people with this ability.

**3. Rationale:** Synaesthesia is a general term describing a neurological condition of sensory overlap. This unique ability allows the synaesthete to perceive certain sensory inputs with senses other than what is considered 'normal' or 'typical.' For example, a synaesthete might see numbers or letters as having a specific and consistent color. Although this condition is rare, several different types of synaesthesia exist. This perception can be within the realms of scent (consistently associated smells), taste (consistently associated flavors), and sight, (colors, shapes, lines, images). Synaesthesia is a rare cognitive state and affects each synaesthete differently. Sacks (2007) suggested that synaesthesia can be as rare as one in two thousand. However, these numbers may be misleading since it is not viewed as a 'condition' by those affected by it. Rather, the sensations experienced by synaesthetes are considered 'normal.'

The main focus of this study is explore synaesthesia and its effects. This is an important topic due to its uniqueness and rarity. The capabilities associated with synaesthetes offer a snapshot about the possibilities of the brain. The potential of humans, as governed by the brain, is amazingly vast. Synaesthesia is one example of the undiscovered mysteries of humans. Although synaesthesia is rare, it can offer advantageous information as to how the brain functions and how humans relate to the world around them.

In addition, synaesthesia provides a wonderful example of the diversity of human beings. Concepts such as politically correct terms, knowing one's ancestry, and being associated with a specific race or gender have become generalities in today's world. However, synaesthesia is one example of how much deeper and complex diversity truly is. The world is full of variety; we must learn as much as we can about it and embrace it.

## **Section II: Description of the Subject Population**

**1. Number of subjects:** The maximum number of participants in the study is 10.

**2. Describe the subject population:** Participants will be any person who experiences some form of synaesthesia.

**3. Describe any specified inclusion/ exclusion criteria:** Any participants who respond to a posted flyer containing a description of synaesthesia and contact information will have an opportunity to participate in the research.

## **Section III: Subject Recruitment**

**1. Describe the method of subject recruitment:** Flyers are to be posted in several buildings on campus. They will contain information regarding what synaesthesia is, including the various forms, as well as my contact information. Those who are under 18 and respond to the recruitment will be required to submit a form of parent or guardian approval.

#### **Section IV: Methods and Procedures**

**1. Describe the methods of procedures to be used:** All interviews will take place on Ball State's campus in Bracken Library, Room 104. It will be reserved for each interview separately. During the interview process, participants will be read a script to introduce them further to the nature of the interview, the types of questions that will be asked, and the consent process. Please see attached script for more information. All participants will be asked the same set of questions regarding their form of synaesthesia. The questions pertain to their experiences, how synaesthesia affects their life, and how they have utilized their potential in this realm. The participant will be asked to read and sign a consent form. The answers will be transcribed, not recorded. No identifying information will be used to differentiate the research subjects.

#### **Section V: Anonymity/ Confidentiality of Data**

**1. Describe how the data will be collected and stored:** The answers to questions will be either written or typed. Due to the non-usage of voice recorders, answers will not be transcribed verbatim. No identifying information will be used in this study.

#### **Section VI: Potential Risks and Benefits**

**1. Describe the potential risks and discomforts:** There are no predictable risks associated with this study. The research will only consist of a questionnaire.

**2. Describe how the risks will be minimized:** There are no potential risks.

**3. Describe the potential benefits:** Due to the rarity of synaesthesia, this research could create an awareness of what it is. Simply bringing it to the attention of others provides a foundation for becoming more aware of the diversity that exists in the world. In addition, utilizing subjects with this ability will unify the components of synaesthesia and how it is experienced in different ways. A wide range of abilities covered coercively has the potential of strengthening the research that currently exists. The opinions and accounts of synaesthetes could provide valuable information to assist others, as well as themselves, in becoming more knowledgeable about synaesthesia.

## **Section VII: Subject Incentives/ Inducements to Participate**

**1. Describe any incentives/ inducements to participate that will be offered to the subjects:** No incentives will be offered to participate in this research.

## **Section VIII: Other Financial Considerations**

**2. Describe any financial expense to the subjects:** There are no costs associated with this research.

**3. Describe any provisions for compensation for research- related injury:** There is no potential risk of injury.

## **Section IX: Informed Consent**

**1. Informed consent procedure:** All participants will be required to fill out and sign a consent form at the beginning of the interview. No parental permission is required since all participants must be over the age of 18.

## **Study Title** Synaesthesia

### **Study Purpose and Rationale**

**Purpose:** The purpose of this study is to explore synaesthesia and the various effects it has on people with this ability.

**Rationale:** Synaesthesia is a general term describing a neurological condition of sensory overlap. This unique ability allows the synaesthete to perceive certain sensory inputs with senses other than what is considered 'normal' or 'typical.' For example, a synaesthete might see numbers or letters as having a specific and consistent color. Although this condition is rare, several different types of synaesthesia exist. This perception can be within the realms of scent (consistently associated smells), taste (consistently associated flavors), and sight, (colors, shapes, lines, images). Synaesthesia is a rare cognitive state and affects each synaesthete differently. Sacks (2007) suggested that synaesthesia can be as rare as one in two thousand. However, these numbers may be misleading since it is not viewed as a 'condition' by those affected by it. Rather, the sensations experienced by synaesthetes are considered 'normal.'

The main focus of this study is explore synaesthesia and its effects. This is an important topic due to its uniqueness and rarity. The capabilities associated with synaesthetes offer a snapshot about the possibilities of the brain. The potential of humans, as governed by the brain, is amazingly vast. Synaesthesia is one example of the undiscovered mysteries of humans. Although synaesthesia is rare, it can offer advantageous information as to how the brain functions and how humans relate to the world around them.

In addition, synaesthesia provides a wonderful example of the diversity of human beings. Concepts such as politically correct terms, knowing one's ancestry, and being associated with a specific race or gender have become generalities in today's world. However, synaesthesia is one example of how much deeper and complex diversity truly is. The world is full of variety; we must learn as much as we can about it and embrace it.

### **Inclusion/Exclusion Criteria**

Any participants who respond to a posted flyer containing a description of synaesthesia and contact information will have an opportunity to participate in the research.

### **Participation Procedures and Duration**

All participants will be asked the same set of questions regarding their form of synaesthesia. The questions pertain to their experiences, personal opinions, how synaesthesia affects their life, and how they have utilized their potential in this realm. The answers will be transcribed, not recorded. No identifying information will be used to differentiate the research subjects.

### **Audio or Video Tapes (if applicable)**

Not applicable.

### **Disclosure of Alternative Procedures**

Not applicable.

### **Data Confidentiality or Anonymity**

All data will be maintained as anonymous and no identifying information such as names will appear in any publication or presentation of the data.

### **Storage of Data**

The answers to questions will be either written or typed. Due to the non-usage of voice recorders, answers will not be transcribed verbatim. Paper data will be stored in a locked filing cabinet in the researcher's office for three years and will then be shredded. The data will also be entered into a software program and stored on the researcher's password-protected computer for three years and then deleted. Only members of the research team will have access to the data.

### **Risks or Discomforts**

There are no perceived risks for participating in this study.

### **Who to Contact Should You Experience Any Negative Effects from Participating in this Study**

Should you experience any feelings of anxiety, there are counseling services available to you through the Counseling Center at Ball State in Muncie, IN, 765-285-1736.

### **Benefits**

Due to the rarity of synaesthesia, this research could create an awareness of what it is. Simply bringing it to the attention of others provides a foundation for becoming more aware of the diversity that exists in the world. In addition, utilizing subjects with this ability will unify the components of synaesthesia and how it is experienced in different ways. A wide range of abilities covered coercively has the potential of strengthening the research that currently exists. The opinions

Date Last Updated: 10/20/2011

Page 1 of 2

and accounts of synaesthetes could provide valuable information to assist others, as well as themselves, in becoming more knowledgeable about synaesthesia.

**Voluntary Participation**

Your participation in this study is completely voluntary and you are free to withdraw your permission at anytime for any reason without penalty or prejudice from the investigator. Please feel free to ask any questions of the investigator before signing this form and at any time during the study.

**IRB Contact Information**

For one's rights as a research subject, you may contact the following: For questions about your rights as a research subject, please contact the Director, Office of Research Compliance, Ball State University, Muncie, IN 47306, (765) 285-5070 or at [irb@bsu.edu](mailto:irb@bsu.edu).

**Study Title**   Synaesthesia

\*\*\*\*\*

**Consent**

I, \_\_\_\_\_, agree to participate in this research project entitled, "Synaesthesia." I have had the study explained to me and my questions have been answered to my satisfaction. I have read the description of this project and give my consent to participate. I understand that I will receive a copy of this informed consent form to keep for future reference.

To the best of my knowledge, I meet the inclusion/exclusion criteria for participation (described on the previous page) in this study.

\_\_\_\_\_  
Participant's Signature

\_\_\_\_\_  
Date

**Researcher Contact Information**

Principal Investigator:

Rachel Buskavitz  
Undergraduate Student  
Ball State University  
Muncie, IN 47306  
Telephone: (812) 455-3144  
Email: [rabuskavitz@bsu.edu](mailto:rabuskavitz@bsu.edu)

Faculty Supervisor:

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Email: [wmucherah@bsu.edu](mailto:wmucherah@bsu.edu)



## **Interview Script and Questions**

Thank you so much for meeting with me today. This interview will be conducted concerning your experiences with synaesthesia. It will last approximately 30 minutes. I will be asking you questions that cover the topics of how you experience synaesthesia, how it affects your everyday life, and how you have utilized your potential in this area. Your answers will be handwritten and will remain private. No identifying information will be used in this study. You are not required to answer any question that makes you feel uncomfortable. In addition, you may choose to discontinue the interview and your participation in this study at any time. If at a later time you do not wish for your answers to be used in this study, please contact me and I will follow through with your request. Do you have any questions? I will now ask you to read and fill out this consent form. (Attached consent form will be provided.) This gives me permission to interview you as well as use the information you provide in my study.

- How do you experience synaesthesia?
- How do you feel about these experiences?
- Are there varying degrees of intensity when you experience it?
- Are there certain 'triggers' that stimulate experiences?
- How long have you experienced it?
- Have you always experienced it the same way or has it changed over time?
- Do you consider synaesthesia as a subconscious process or as something you can control? Why?
- How does synaesthesia affect various aspects of your life?
- How have you utilized your potential within the realm of synaesthesia?
- How does synaesthesia help or hinder you in every day life?